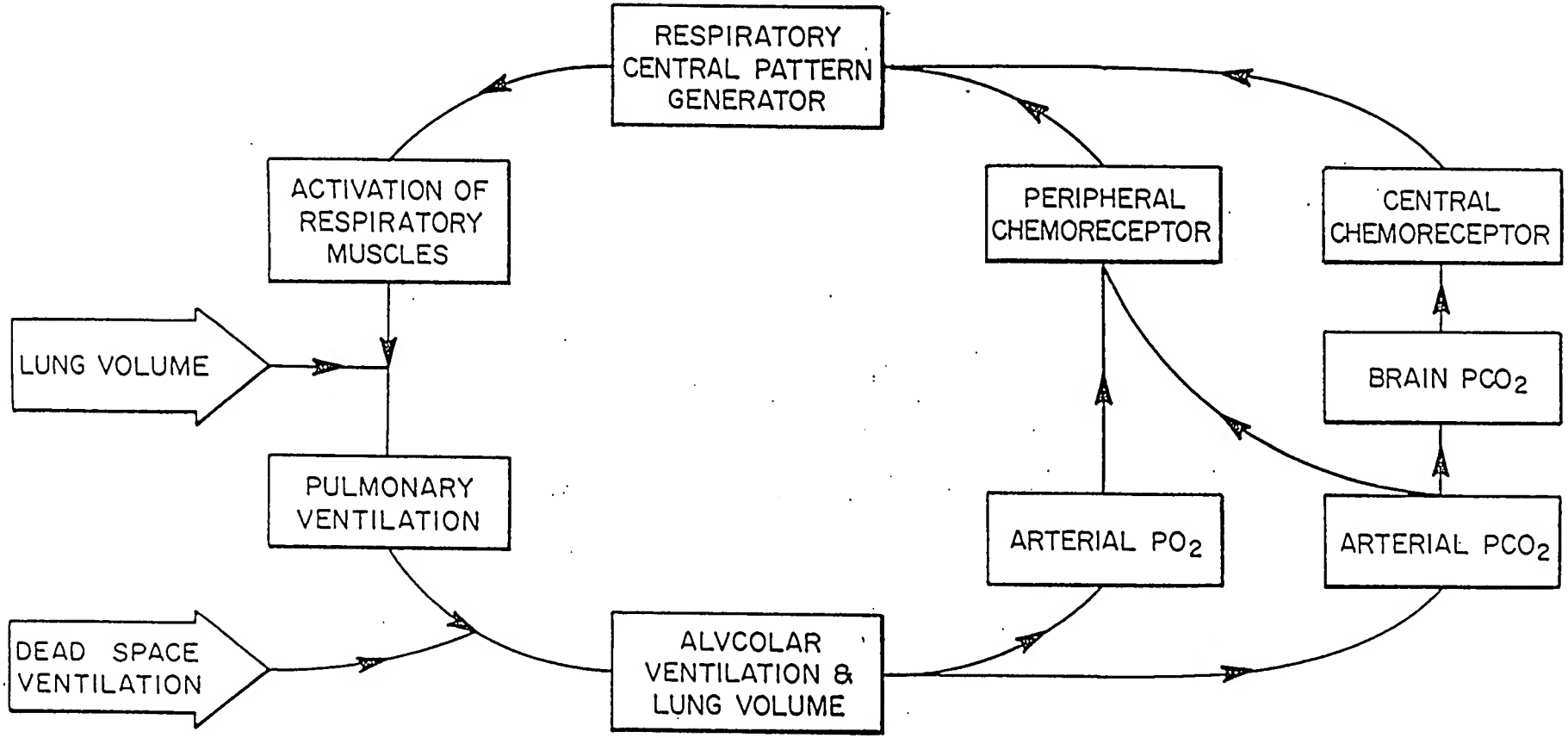
RESPIRATORY CENTRAL PATTERN GENERATOR
ACTIVATION OF RESPIRATORY MUSCLES
LUNG VOLUME
PULMONARY VENTILATION
DEAD SPACE VENTILATION
ALVCOLAR VENTILATION & LUNG VOLUME
PERIPHERAL CHEMORECEPTOR
CENTRAL CHEMORECEPTOR
BRAIN PCO_2
ARTERIAL PO_2
ARTERIAL PCO_2

FIG_1

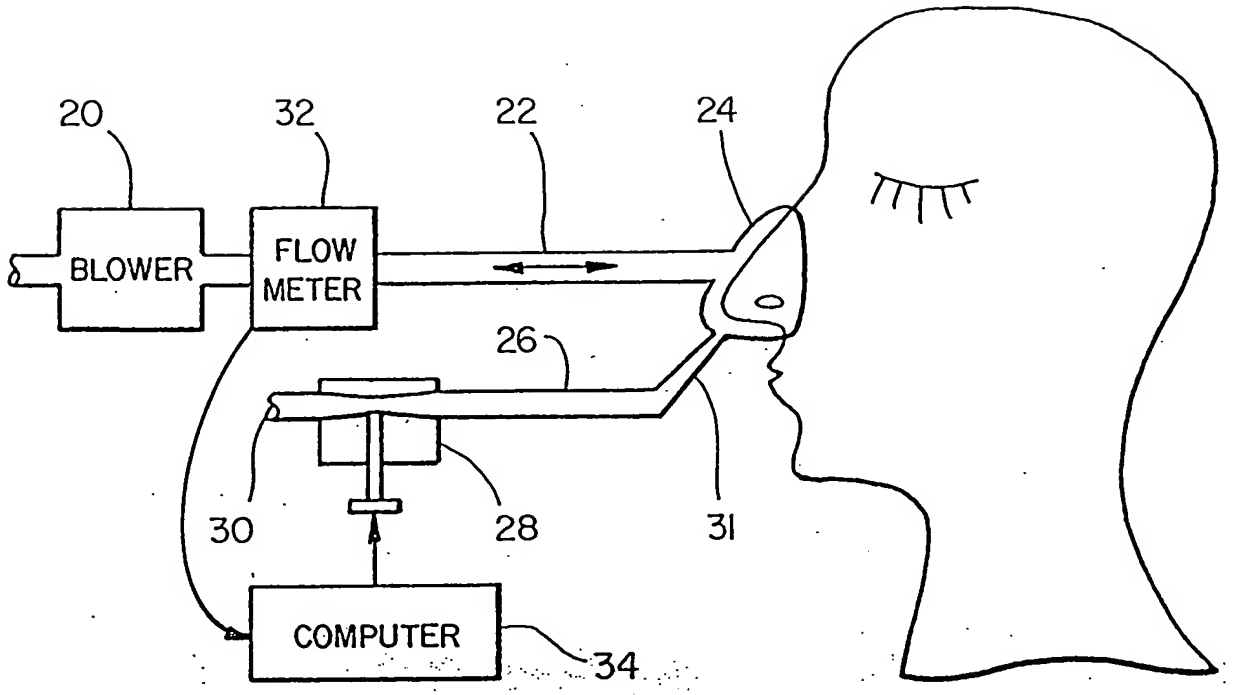
20
32
22
24
BLOWER
FLOW METER
26
30
28
31
COMPUTER
34

FIG_2

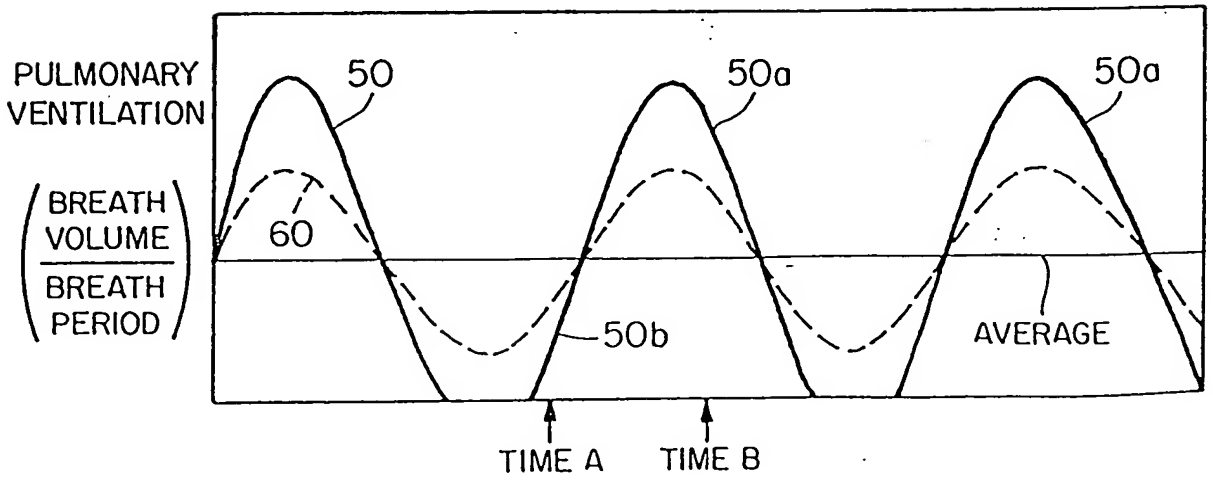
PULMONARY VENTILATION
BREATH VOLUME / BREATH PERIOD
50
50a
50a
60
50b
AVERAGE
TIME A
TIME B

FIG_3

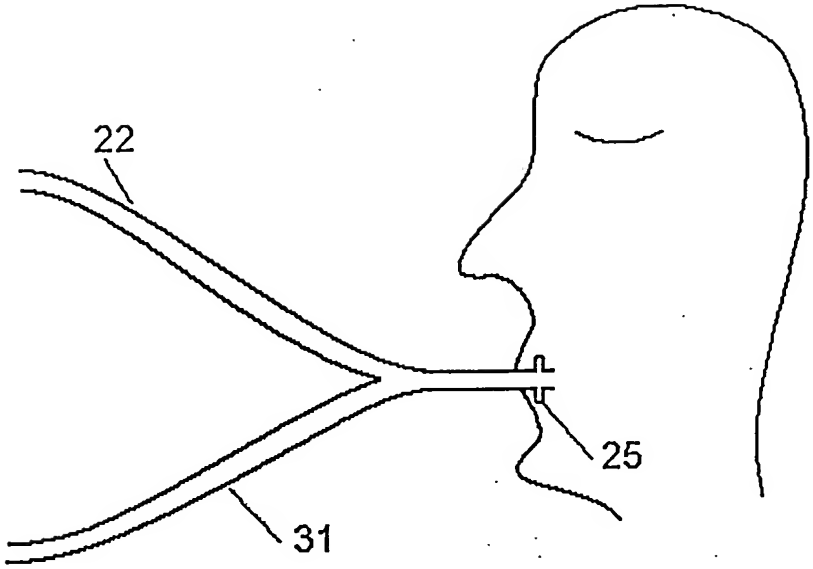

Figure 2A

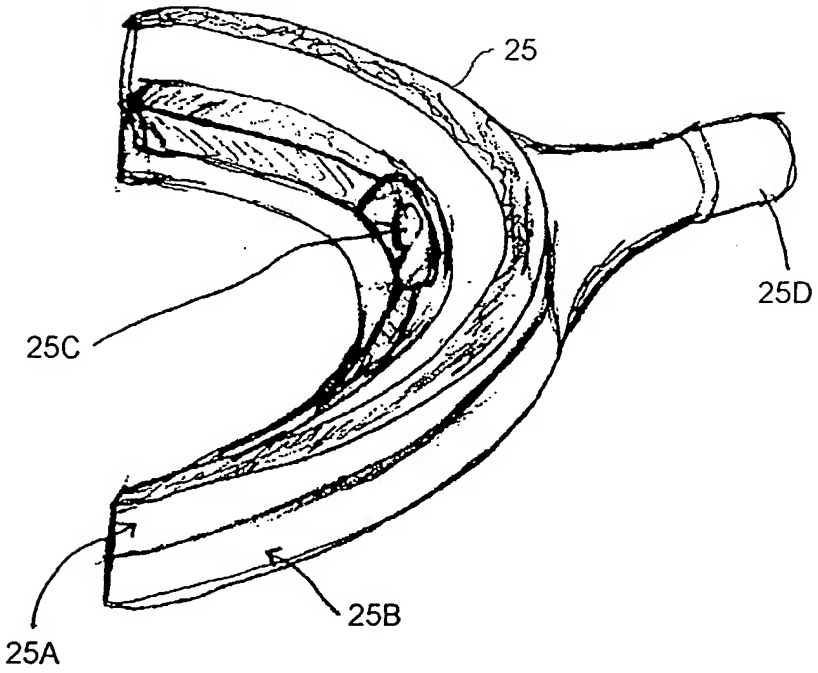

FIG. 2B

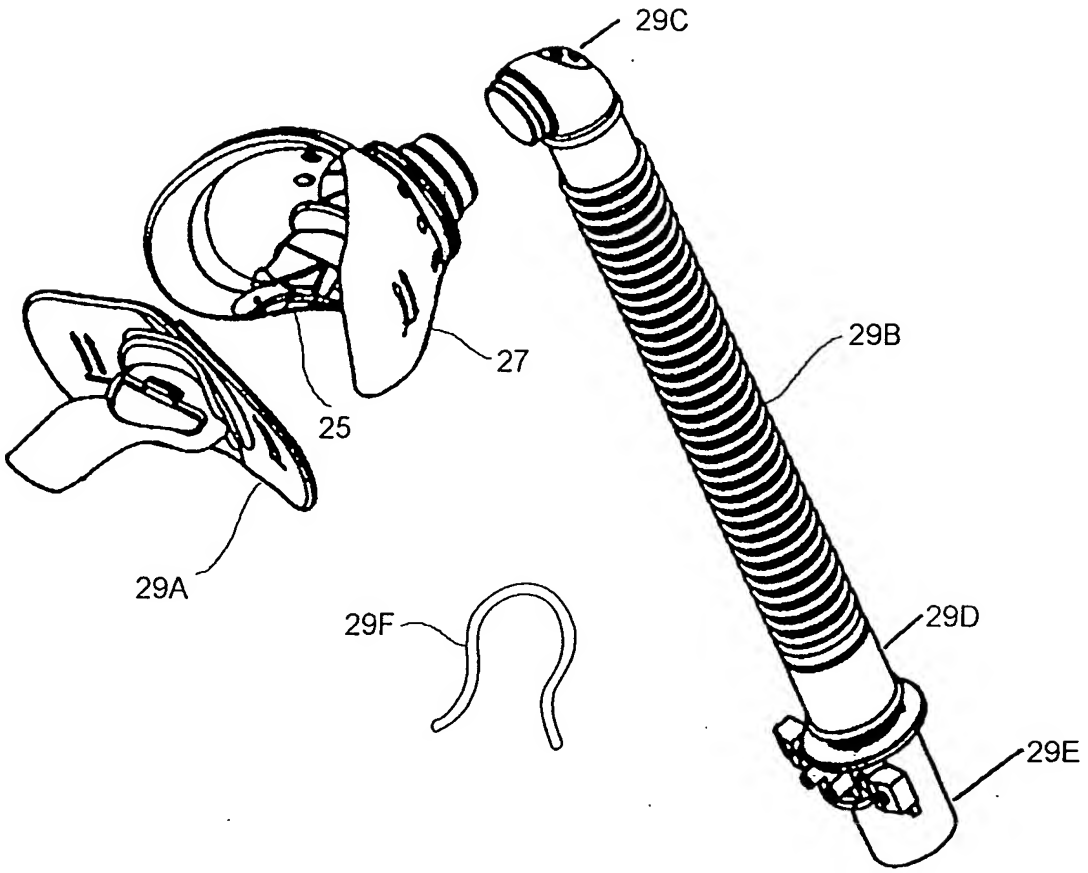

FIG. 2C

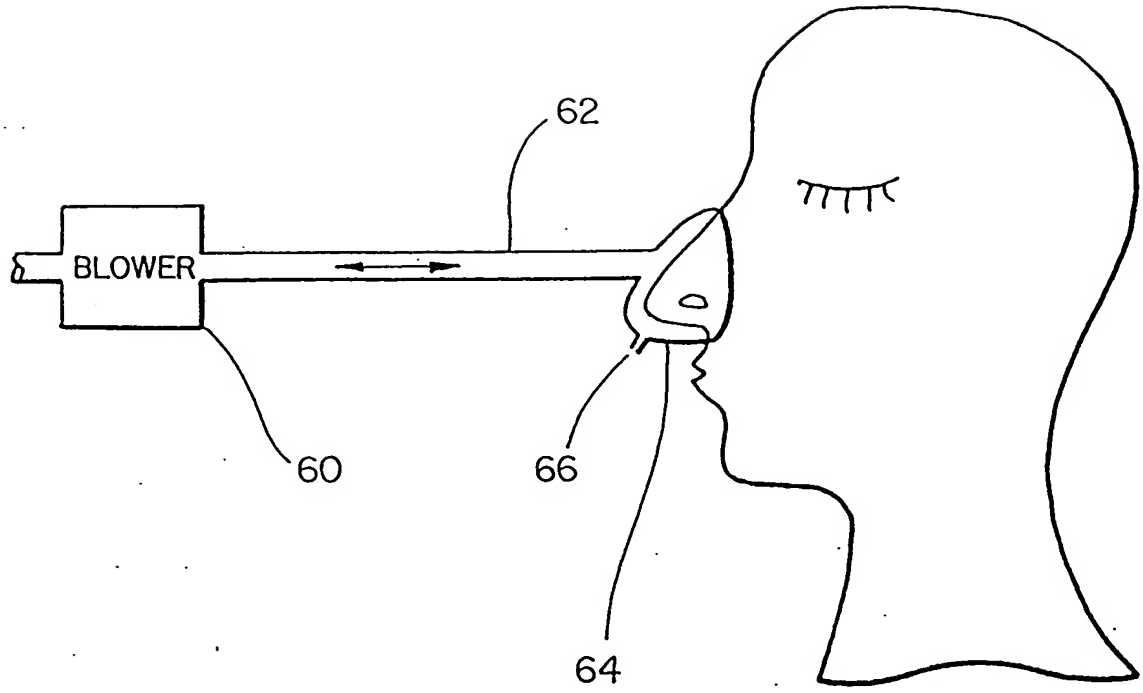

FIG_4A

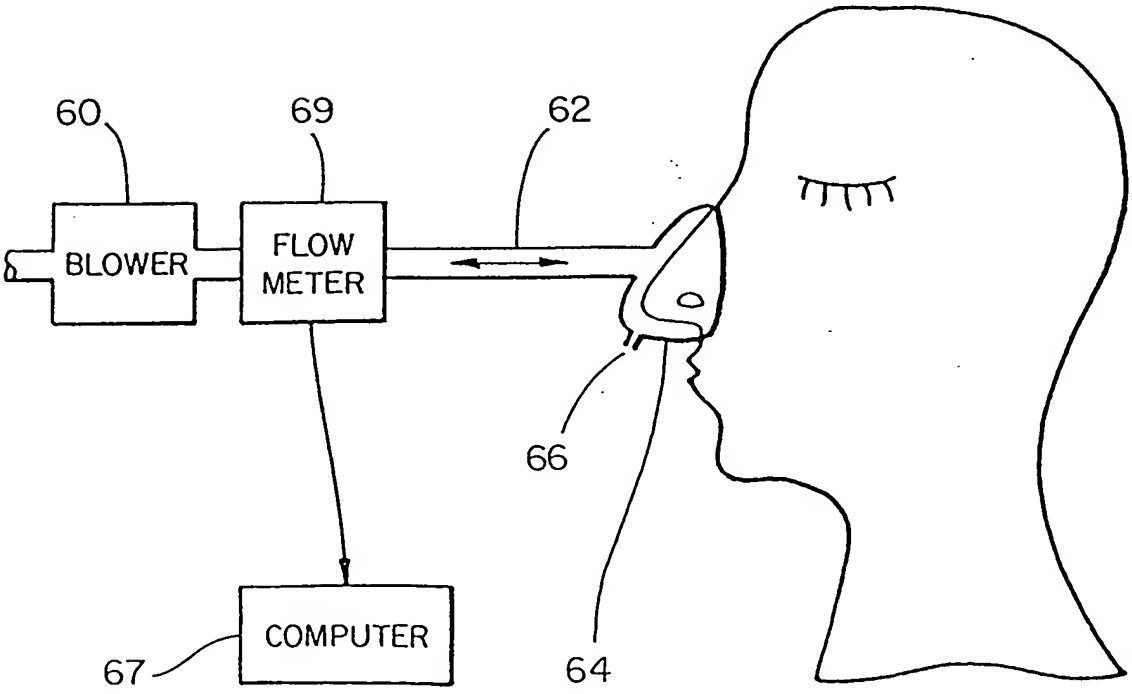

FIG_4B

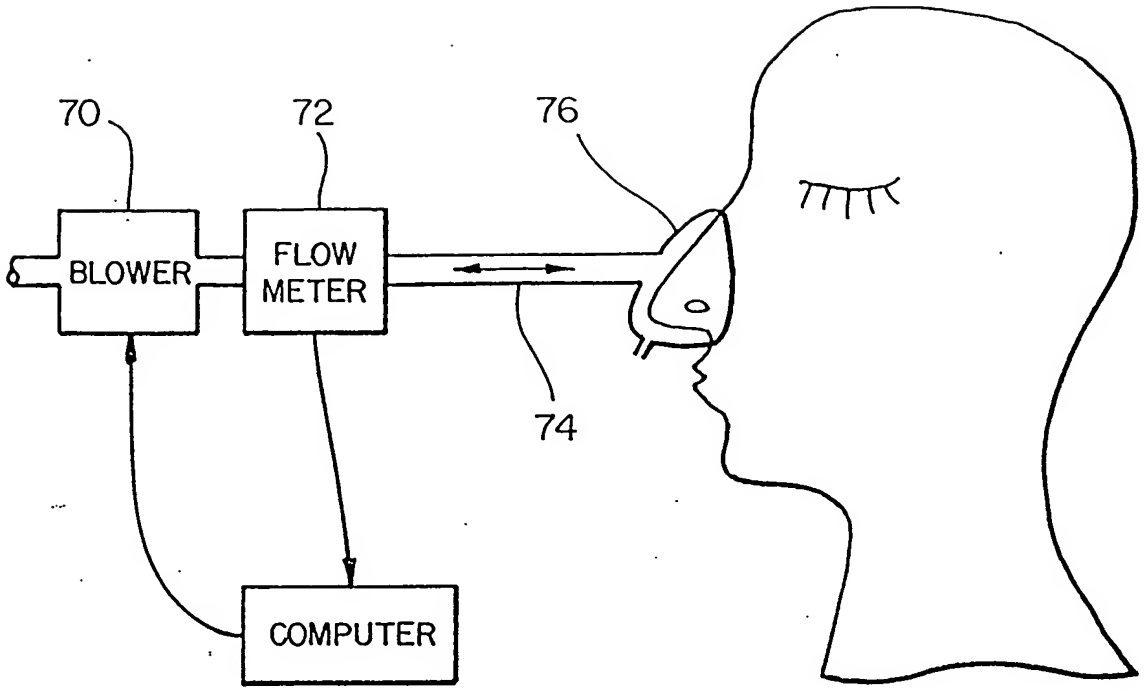
70
72
76
BLOWER
FLOW METER
74
COMPUTER

FIG_5

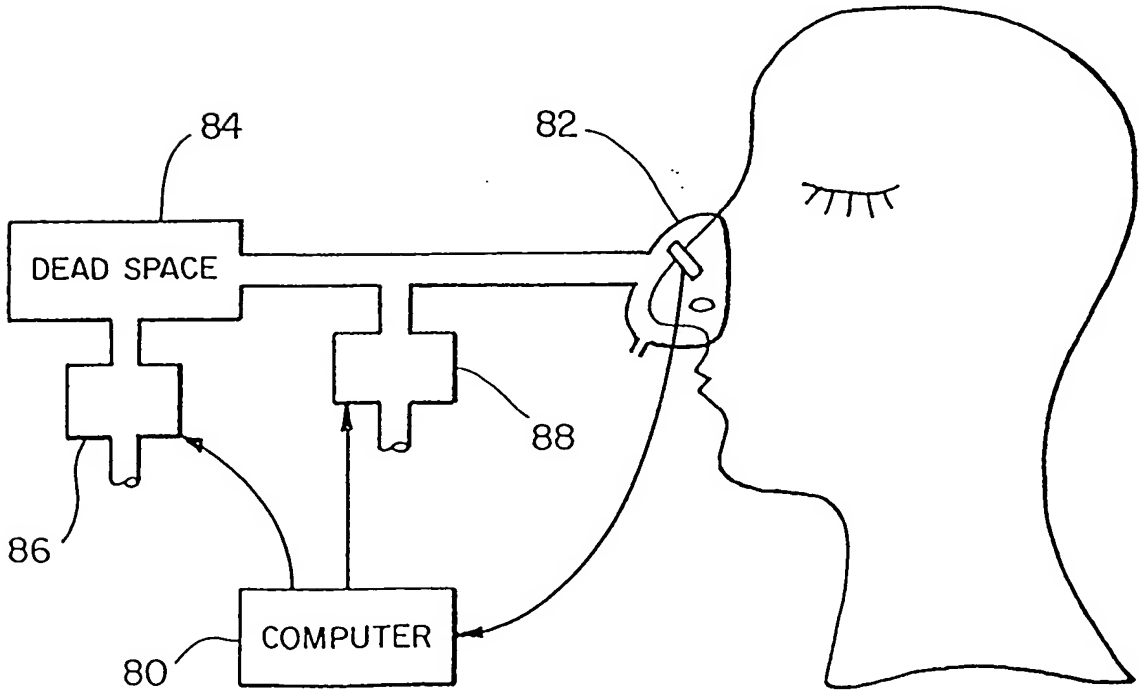
84
82
DEAD SPACE
88
86
COMPUTER
80

FIG_6

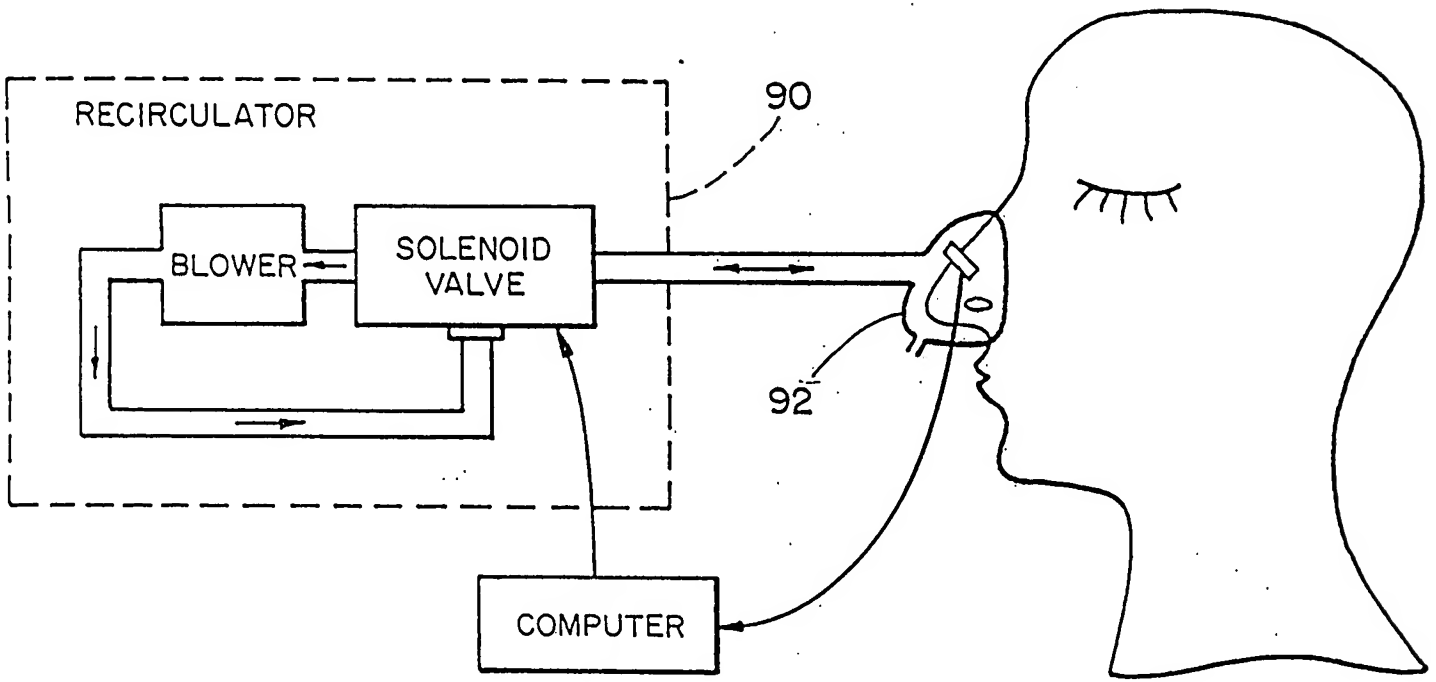

FIG_7

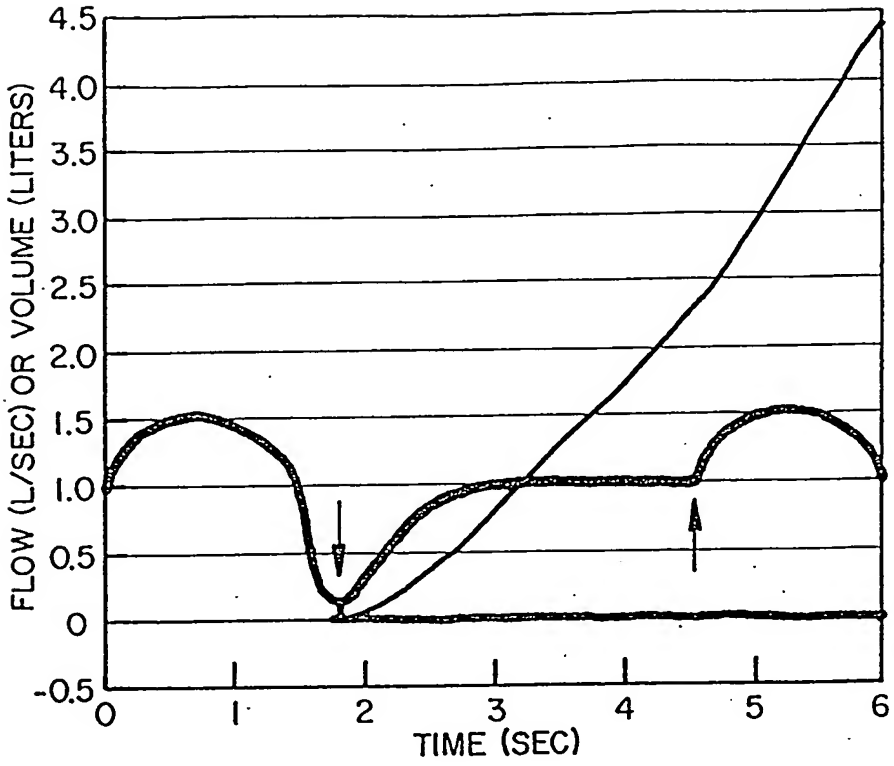
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
FLOW (L/SEC) OR VOLUME (LITERS)
0
1
2
3
4
5
6
TIME (SEC)

FIG_8A

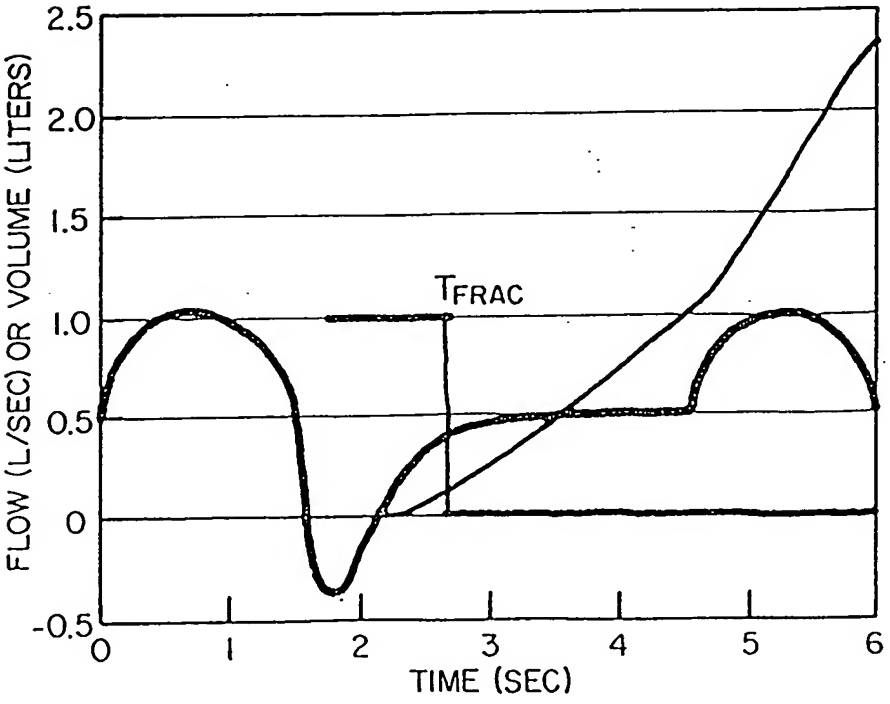
2.5
2.0
1.5
1.0
0.5
0
-0.5
FLOW (L/SEC) OR VOLUME (LITERS)
TFRAC
0
1
2
3
4
5
6
TIME (SEC)

FIG_8B

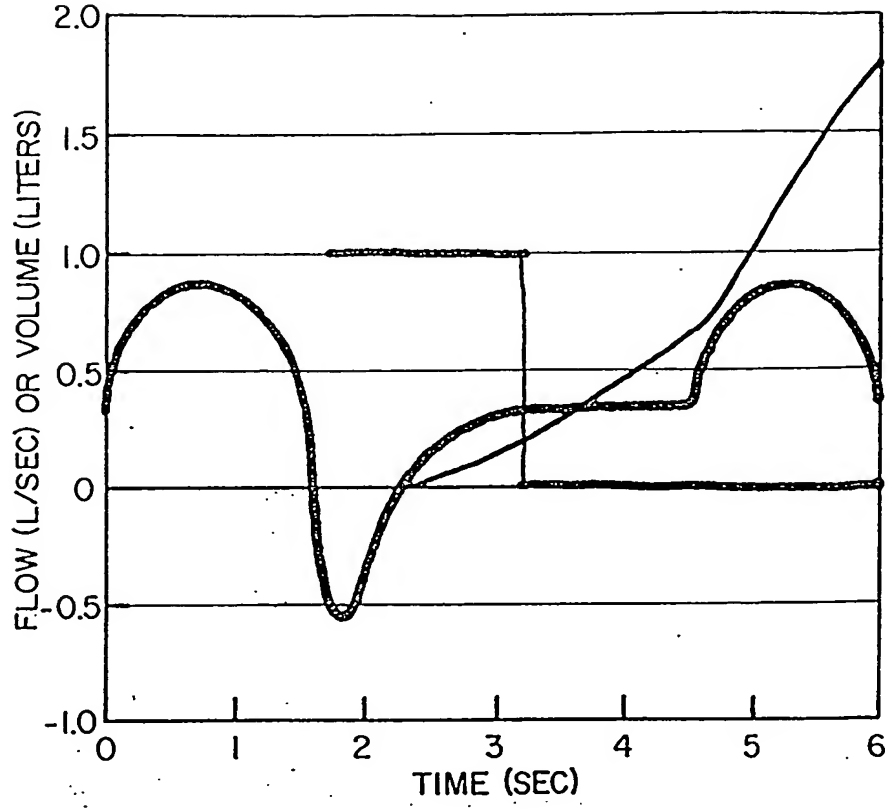
2.0
1.5
1.0
0.5
0
-0.5
-1.0
FLOW (L/SEC) OR VOLUME (LITERS)
0
1
2
3
4
5
6
TIME (SEC)

FIG_8C

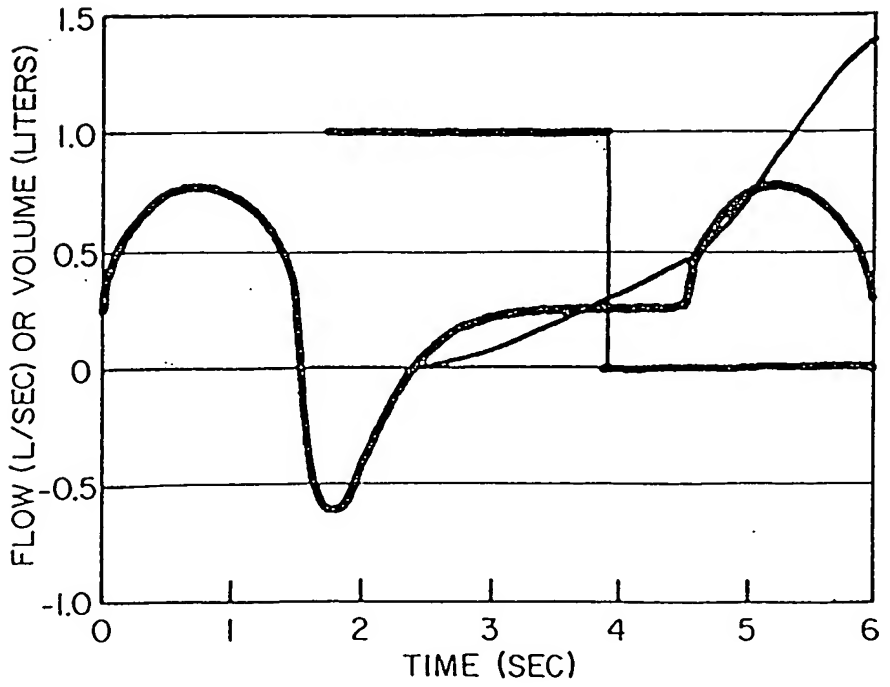
1.5
1.0
0.5
0
-0.5
-1.0
FLOW (L/SEC) OR VOLUME (LITERS)
0
1
2
3
4
5
6
TIME (SEC)

FIG_8D

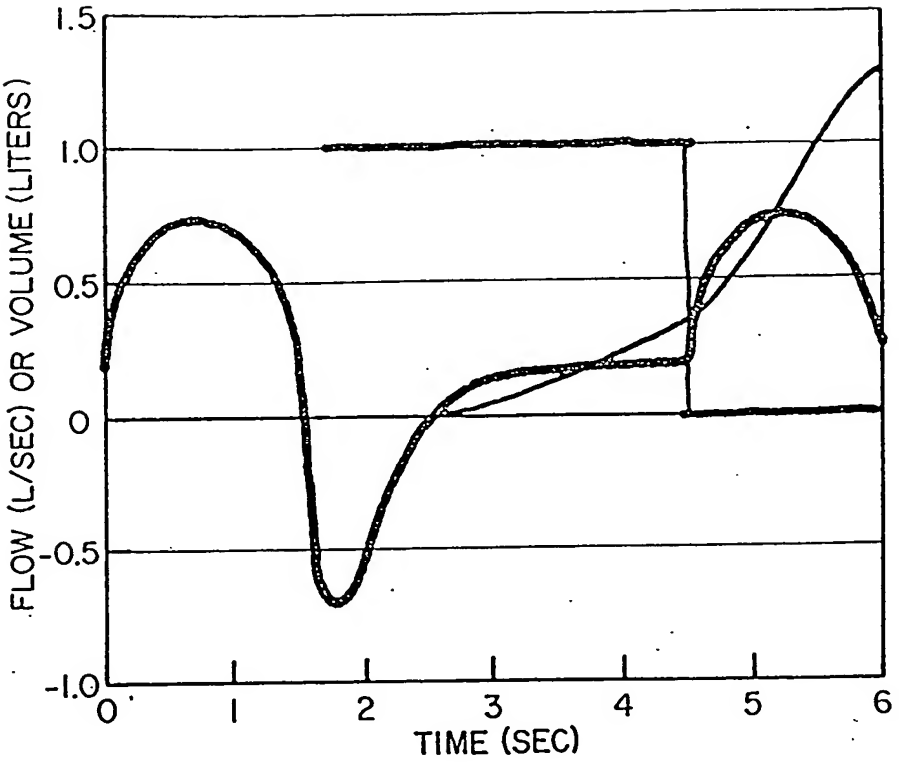
1.5
1.0
0.5
0
-0.5
-1.0
FLOW (L/SEC) OR VOLUME (LITERS)
0
1
2
3
4
5
6
TIME (SEC)

FIG_8E

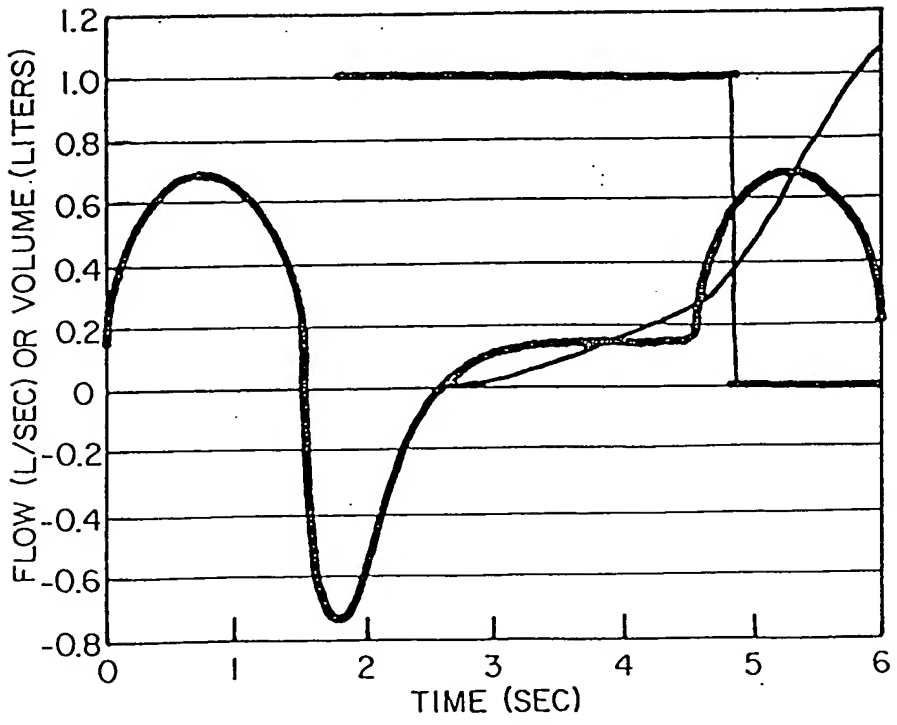
1.2
1.0
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
FLOW (L/SEC) OR VOLUME (LITERS)
0
1
2
3
4
5
6
TIME (SEC)

FIG_8F

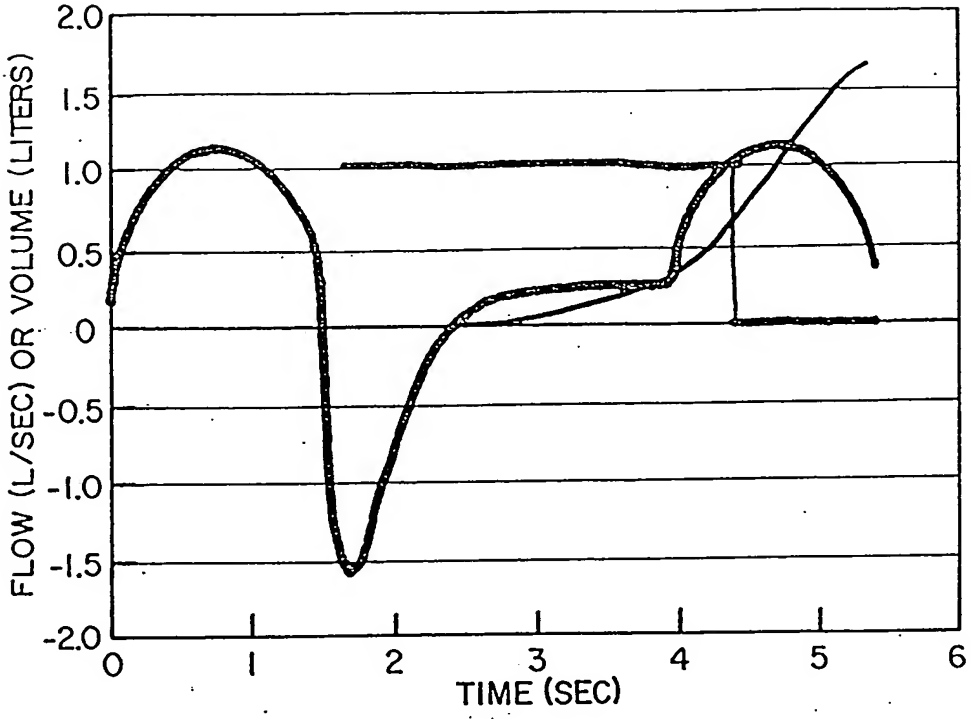
2.0
1.5
1.0
0.5
0
-0.5
-1.0
-1.5
-2.0
FLOW (L/SEC) OR VOLUME (LITERS)
0
1
2
3
4
5
6
TIME (SEC)

FIG_9A

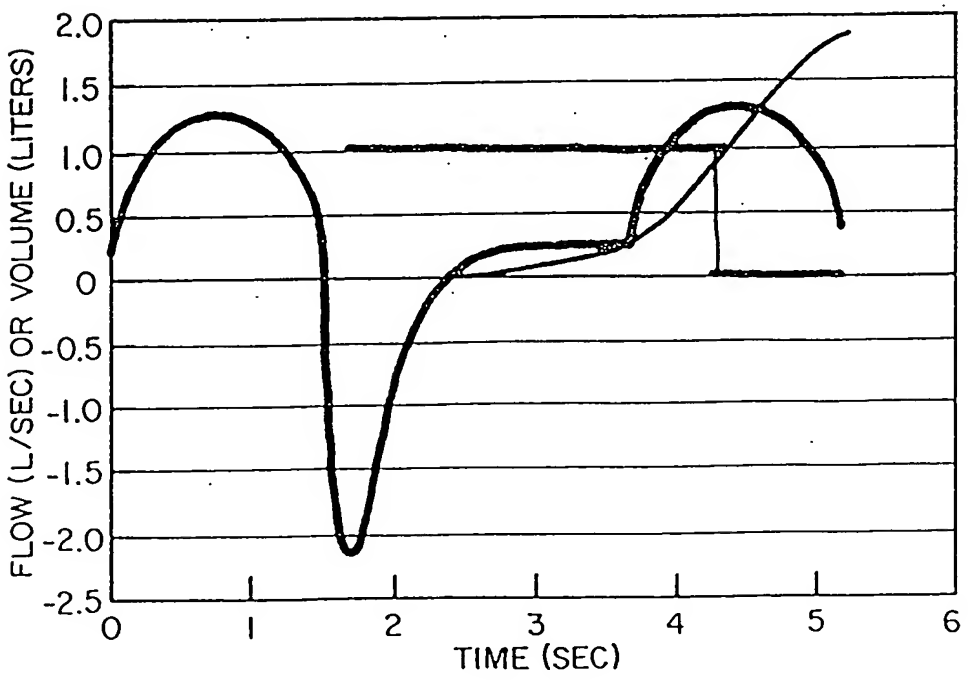
2.0
1.5
1.0
0.5
0
-0.5
-1.0
-1.5
-2.0
-2.5
FLOW (L/SEC) OR VOLUME (LITERS)
0
1
2
3
4
5
6
TIME (SEC)

FIG_9B

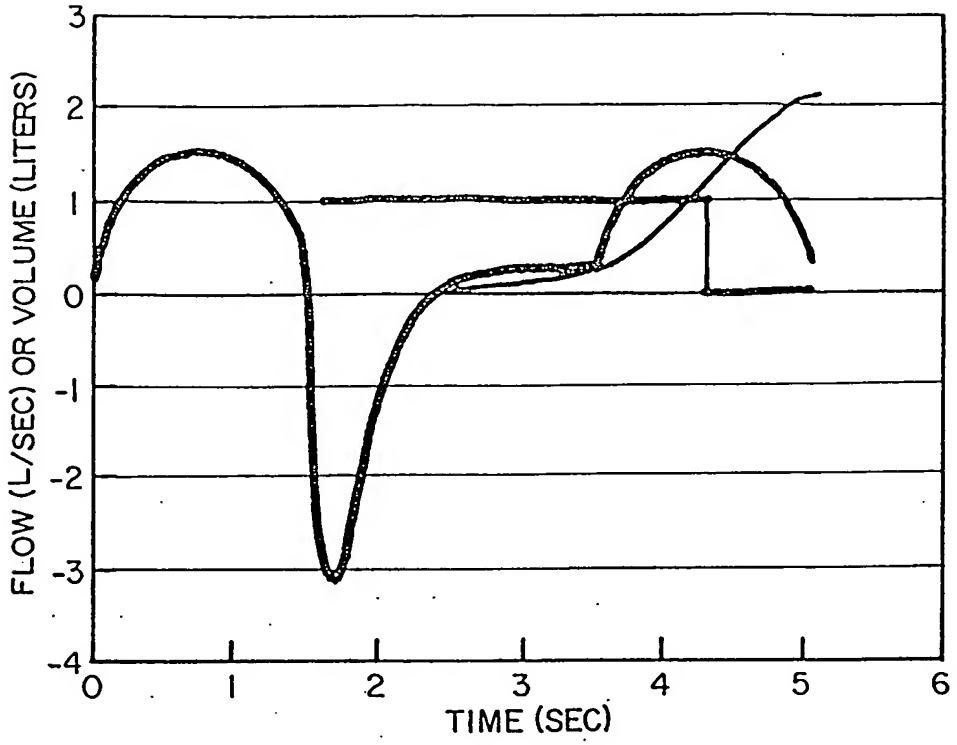
FLOW (L/SEC) OR VOLUME (LITERS)
3
2
1
0
-1
-2
-3
-4
0
1
2
3
4
5
6
TIME (SEC)

FIG_9C

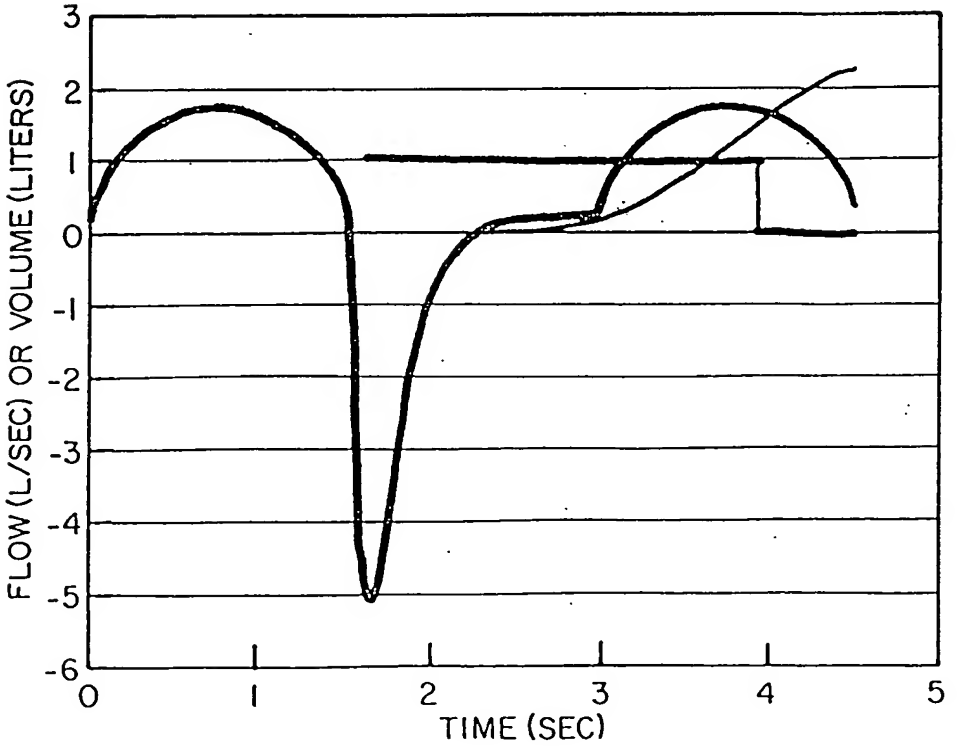
FLOW (L/SEC) OR VOLUME (LITERS)
3
2
1
0
-1
-2
-3
-4
-5
-6
0
1
2
3
4
5
TIME (SEC)

FIG_9D

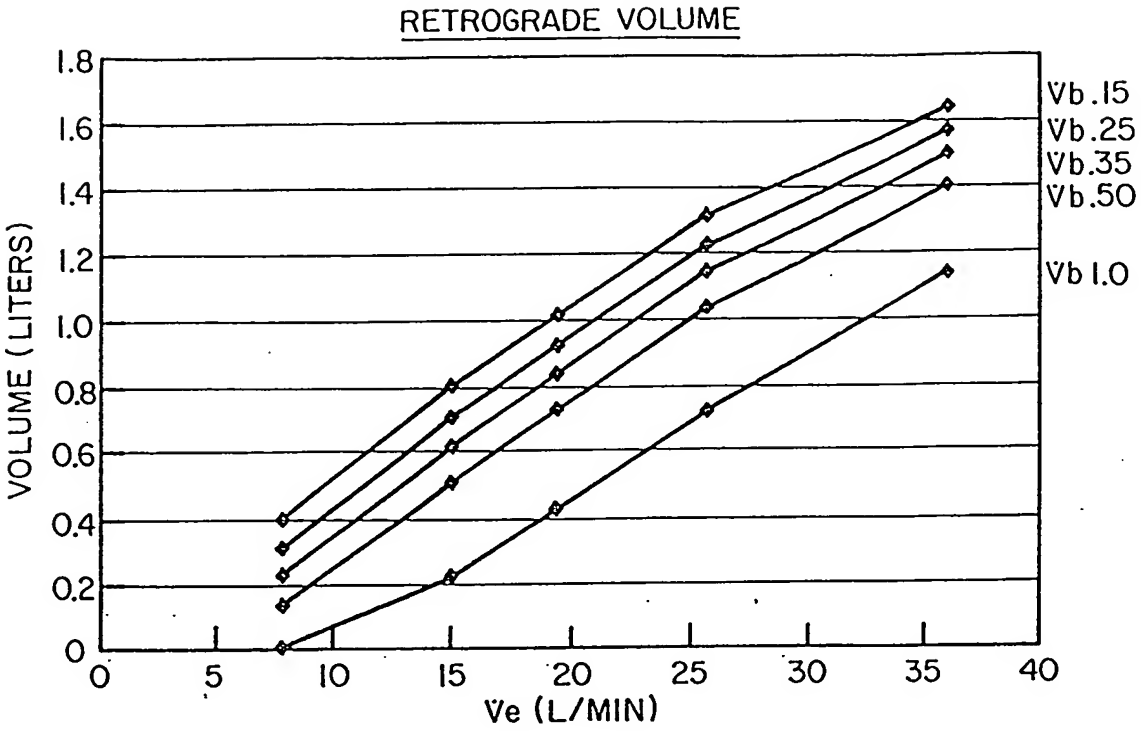
RETROGRADE VOLUME
VOLUME (LITERS)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
0
5
10
15
20
25
30
35
40
V̇e (L/MIN)
V̇b.15
V̇b.25
V̇b.35
V̇b.50
V̇b 1.0

FIG_10

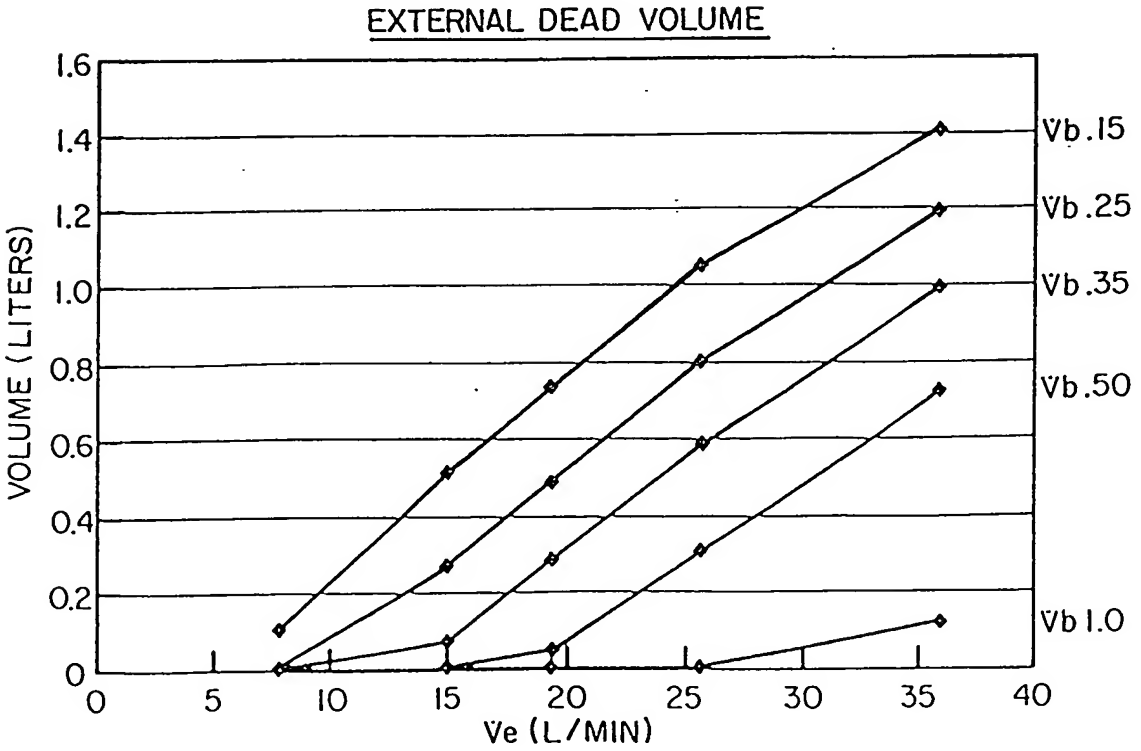
EXTERNAL DEAD VOLUME
VOLUME (LITERS)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
0
5
10
15
20
25
30
35
40
V̇e (L/MIN)
V̇b.15
V̇b.25
V̇b.35
V̇b.50
V̇b 1.0

FIG_11

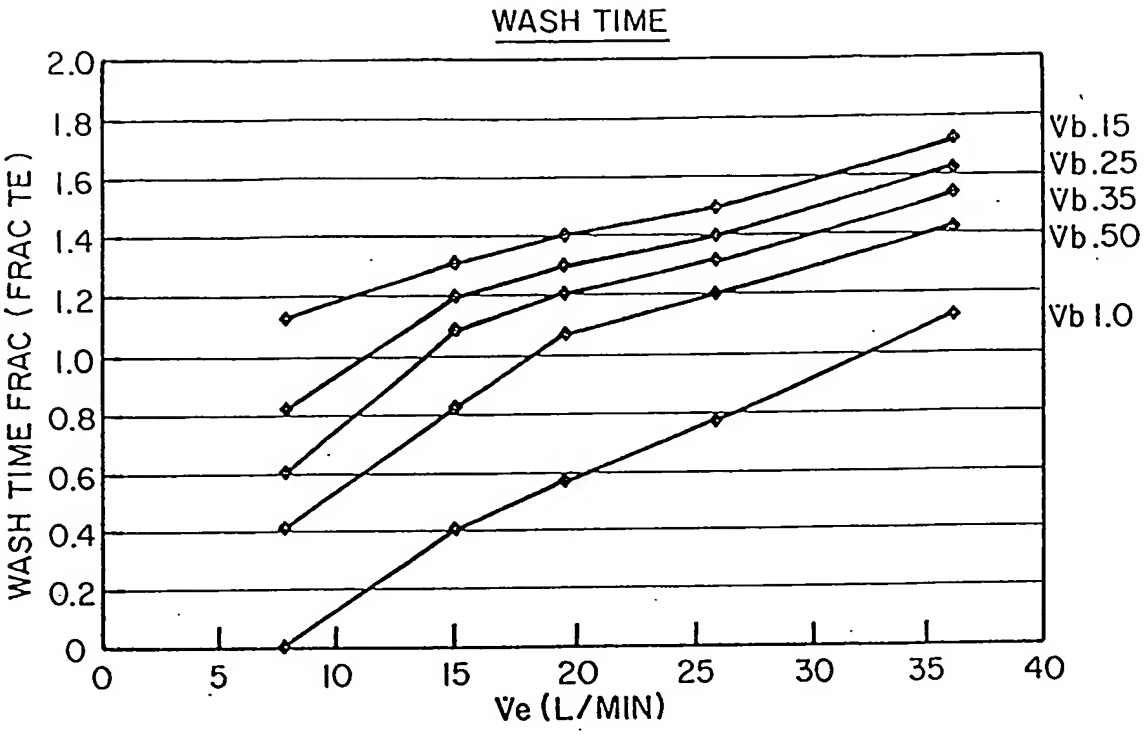
WASH TIME
WASH TIME FRAC (FRAC TE)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
0
5
10
15
20
25
30
35
40
Ve (L/MIN)
Vb.15
Vb.25
Vb.35
Vb.50
Vb 1.0

FIG_12

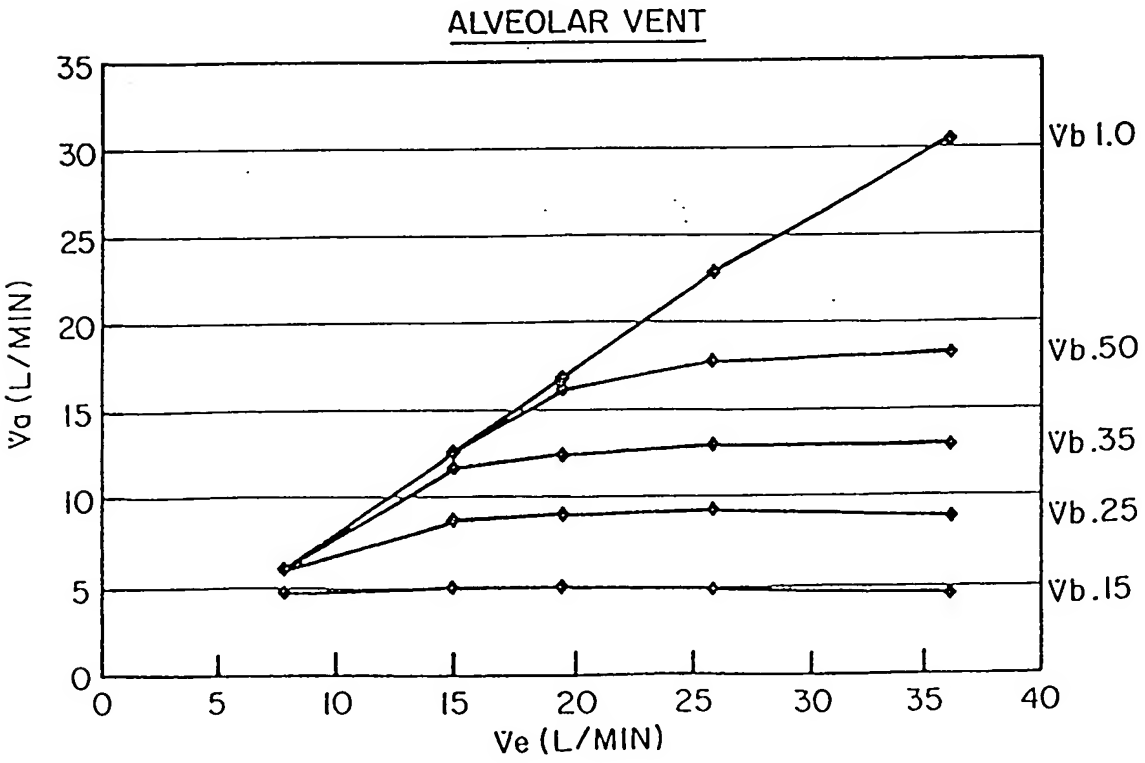
ALVEOLAR VENT
Va (L/MIN)
35
30
25
20
15
10
5
0
0
5
10
15
20
25
30
35
40
Ve (L/MIN)
Vb 1.0
Vb.50
Vb.35
Vb.25
Vb.15

FIG_13

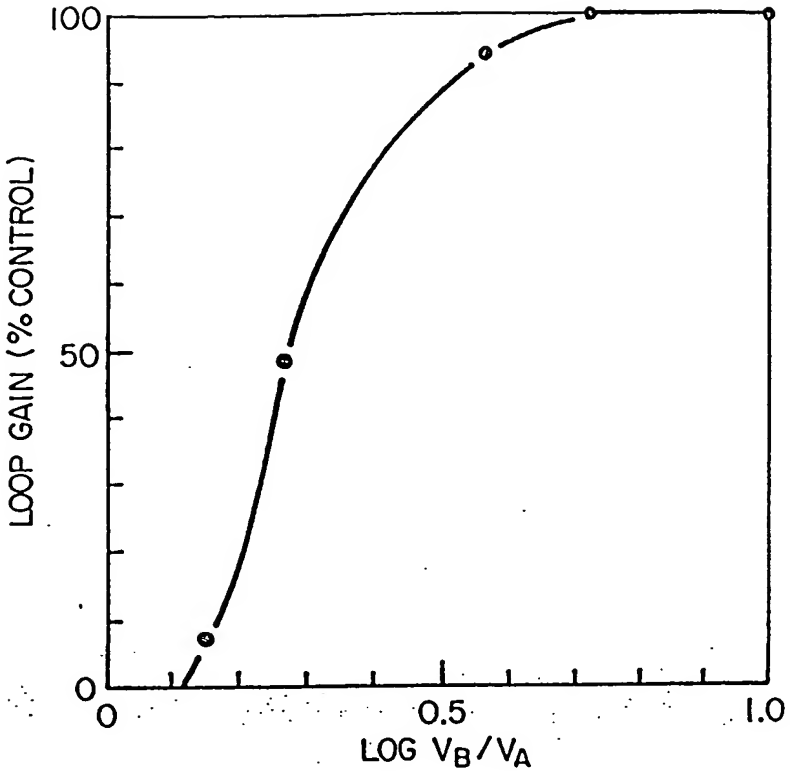

FIG_14

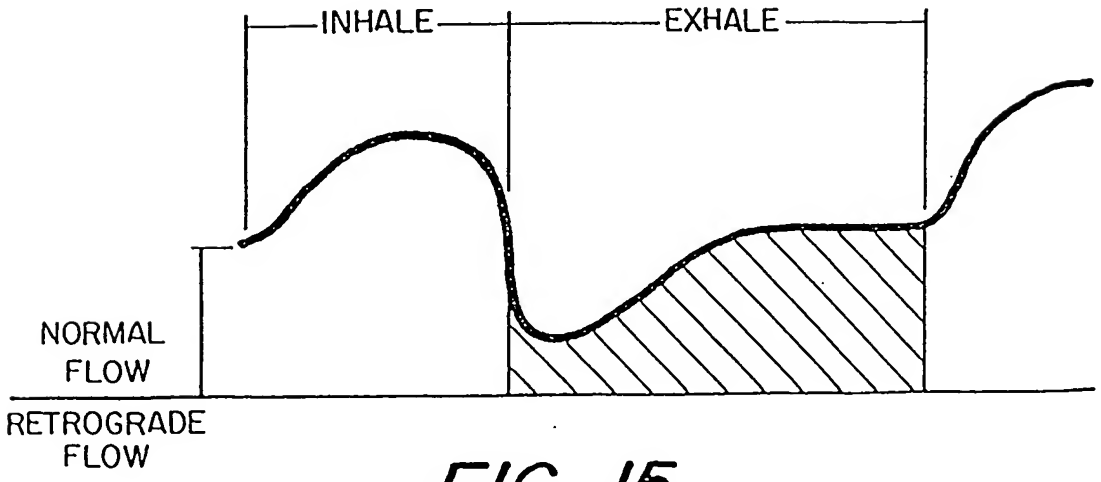

FIG_15
(PRIOR ART)

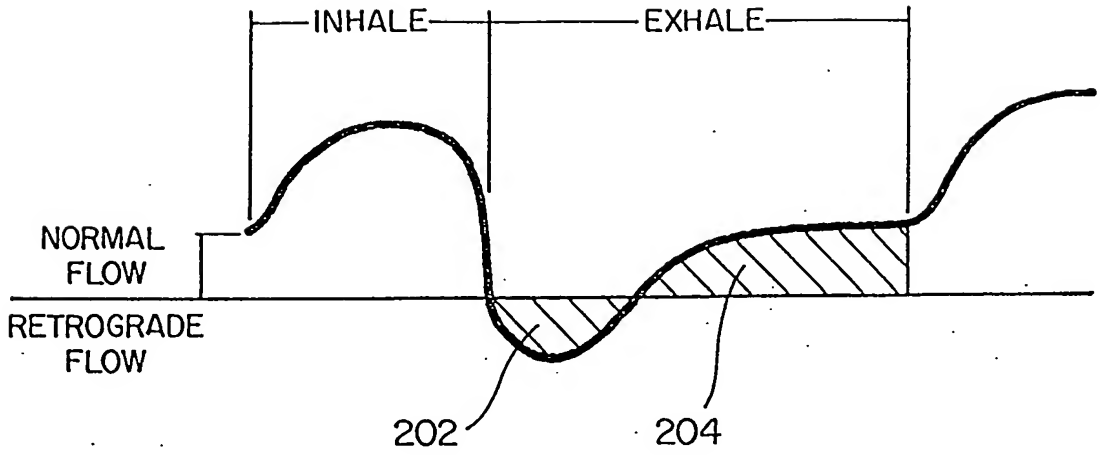
INHALE
EXHALE
NORMAL FLOW
RETROGRADE FLOW
202
204

FIG_16

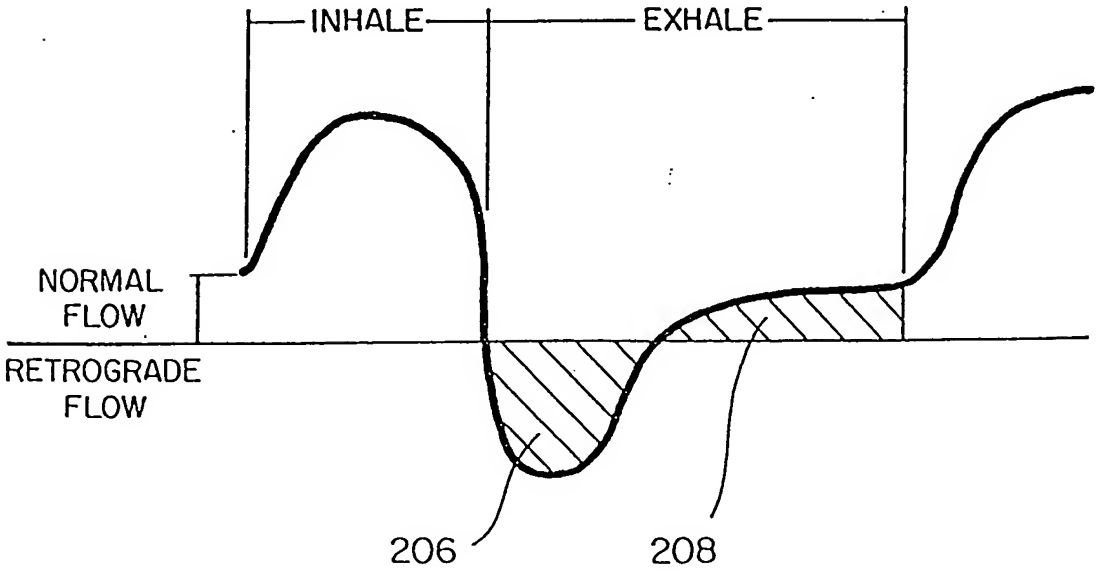
INHALE
EXHALE
NORMAL FLOW
RETROGRADE FLOW
206
208

FIG_17

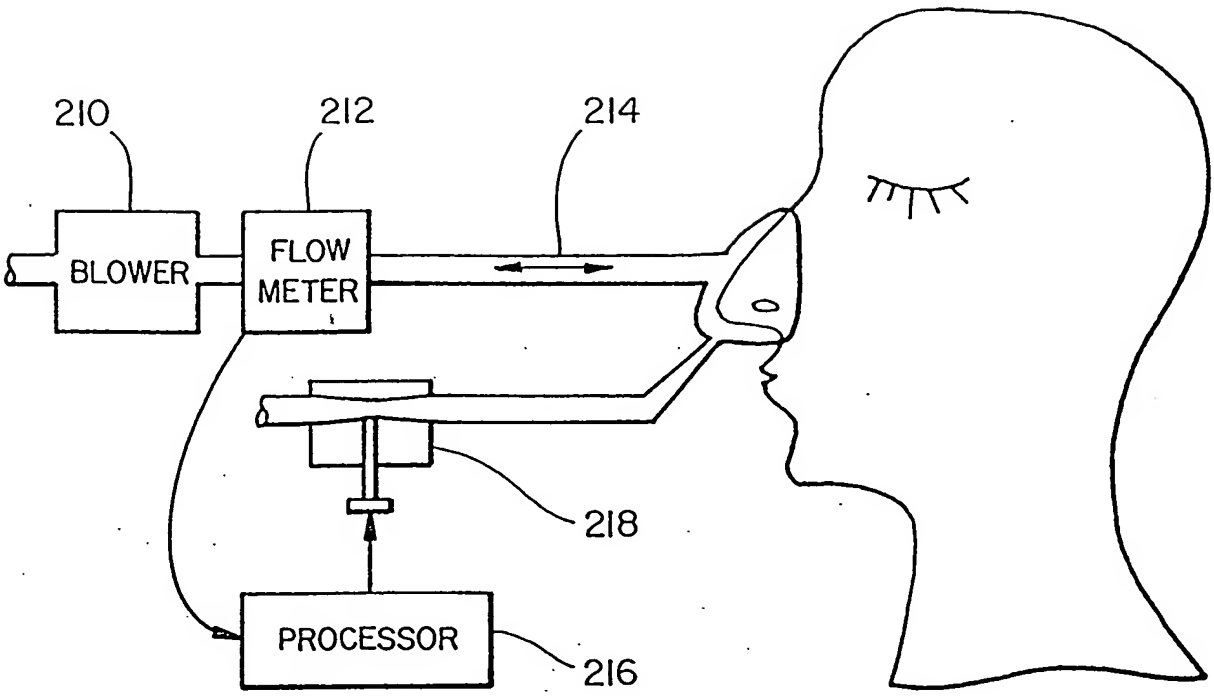

FIG_18A

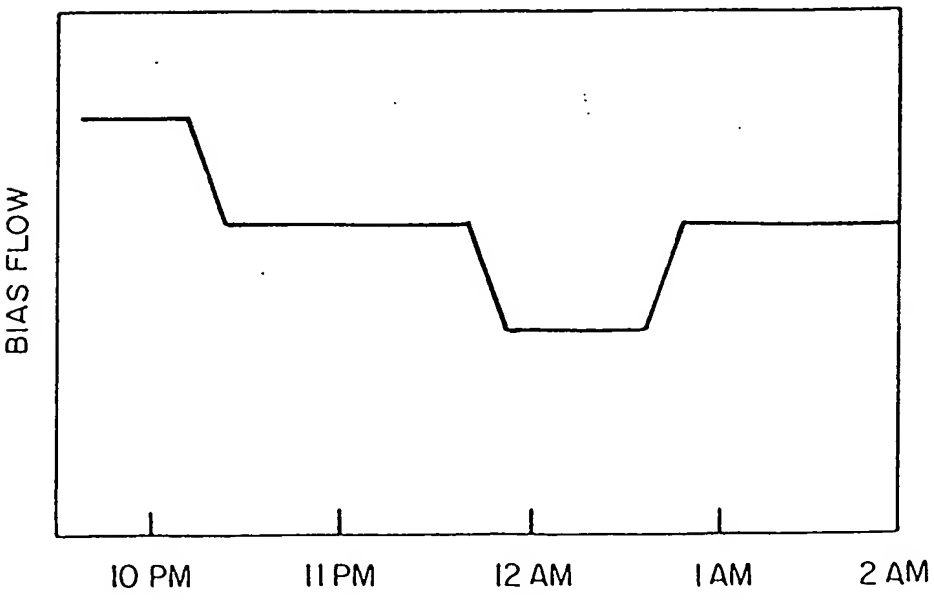

FIG_18B

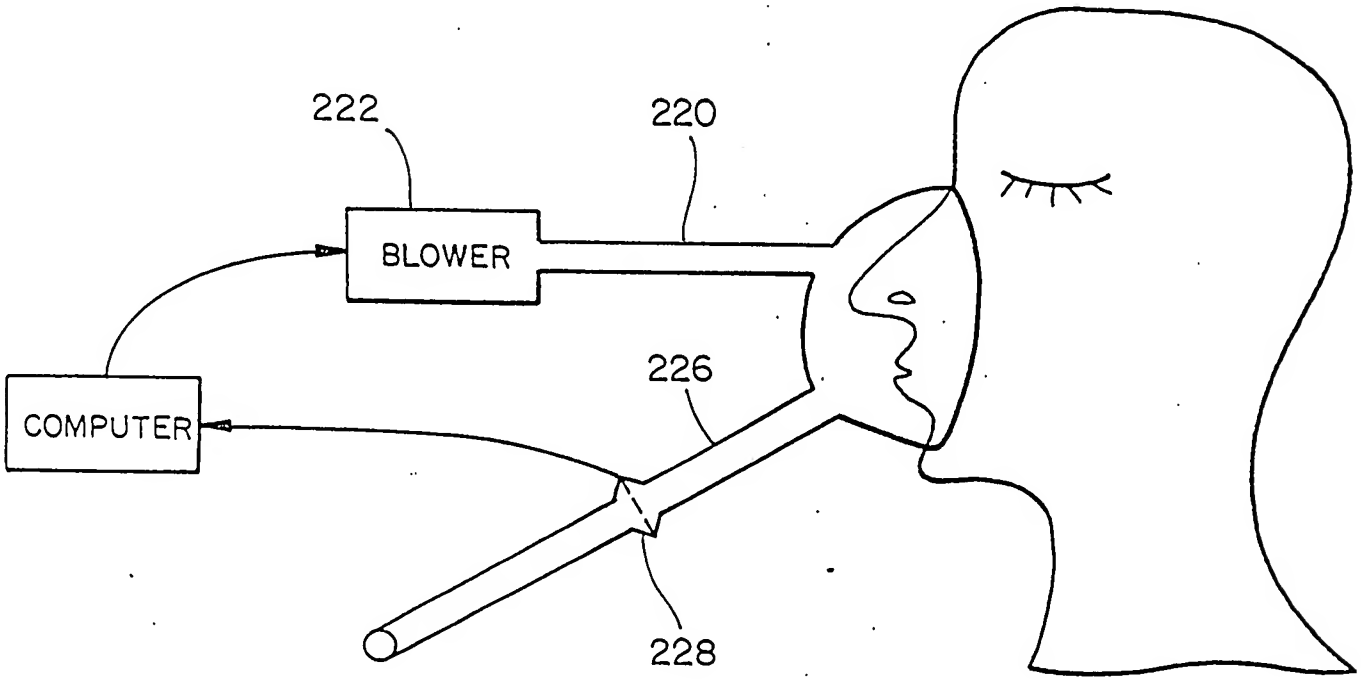

FIG_19